CLAIMS:

- 1. A waveguide structure for upconversion of IR wavelength laser radiation comprising a) at least one base substrate layer made essentially out of a moisture-stable mechanically- and/or temperature-stable material; b) at least one active layer made essentially out of a halide glass, preferably a fluoride glass located on the base substrate layer whereby the material of the at least one base substrate layer has a different composition from the material of the at least one active layer
- A waveguide structure according to Claim 1, whereby the efficacy of the waveguide structure is ≥10 % and ≤90%, the efficacy being defined as
   radiated and/or emitted power of usable radiation out of the waveguide structure
   10 IR-power absorbed in the waveguide structure
   and usable radiation being defined as upconverted light in red, green and/or blue
  - 3. A waveguide structure according to claim 1 or 2, whereby the thickness of the active layer is  $\geq 0$  and  $\leq 5$   $\mu m$ .
- 4. A waveguide structure according to claim 1 or 3, whereby the active layer material is selected out of a group containing: ZBLAN, consisting essentially of the components ZrF<sub>4</sub>, BaF<sub>2</sub>, LaF<sub>3</sub>, AlF<sub>3</sub> and NaF, doped with one or more rare earth ions from the group Er, Yb, Pr, Tm, Ho, Dy, Eu, Nd or a combination thereof, one or more of the crystals LiLuF<sub>4</sub>, LiYF<sub>4</sub>, BaY<sub>2</sub>F<sub>8</sub>, SrF<sub>2</sub>, LaCl<sub>3</sub>, KPb<sub>2</sub>Cl<sub>5</sub>, LaBr<sub>3</sub> doped with one or more rare earth ions from the group Er, Yb, Pr, Tm, Ho, Dy, Eu, Nd or a combination thereof, one or more of the rare earth doped metal fluorides Ba-Ln-F and Ca-Ln-F, where Ln is one or more rare earth ions from the group Er, Yb, Pr, Tm, Ho, Dy, Eu, Nd or a combination thereof, or mixtures thereof.

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- 5. A waveguide structure according to any of the claims 1 to 3, whereby the base substrate layer material has a weakening temperature of ≥300 °C and ≤2000 °C and/or has a lower refractive index than the active layer material.
- 5 6. A waveguide structure according to claims 1 to 5, whereby the base substrate layer material is selected out of a group comprising quartz glass, hard glass, MgF<sub>2</sub> and mixtures thereof.
- 7. A waveguide structure according to claims 1 to 6, whereby the active layer is coated on the base substrate layer by hot dip spin coating.
- 8. A waveguide structure according to claims 1 to 7, whereby
   a length of the active layer is ≥ 100 μm and ≤ 100,000 μm, preferably ≥ 200 μm, more preferably ≥ 500 μm and most preferably ≥ 1000 μm and ≤ 50,000 μm; and/or
  15 a width of the active layer is ≥ 1 μm and ≤ 200 μm
  - 9. A waveguide structure according to claims 1 to 8, furthermore comprising a sealing layer located on the active layer in such a way, that the active layer is between the base substrate layer and the sealing layer, the sealing layer material being preferably selected out of a group comprising SiO<sub>2</sub>, higher index of refraction materials, preferably Al<sub>2</sub>O<sub>3</sub> and/or Si<sub>3</sub>N<sub>4</sub>, polymers, spin on glass or mixtures thereof, either alone or in combination with an optical isolation layer, preferably from undoped ZBLAN.
- 10. A lighting unit comprising at least one of the waveguide structures according to one of the claims 1 to 9, being designed for the usage in one of the following applications: shop lighting, home lighting, accent lighting, spot lighting, theater lighting, automotive headlighting, fiber-optics applications, and projection systems.